CENTRES OF VOCATIONAL EXCELLENCE

Learning+Skills Council

learning and skills development agency

Contributing to sustainable development

Centres of Vocational Excellence

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research report

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Stephen Martin is an LSDA consultant.
Maureen Martin also worked on the report.

Administrative support for the project was provided by Sarah Davies at LSDA.

The CoVE providers visited as part of the project were:

Provider	*CoVE area*
Somerset College of Arts and Technology	Construction: Crafts, Professions and Sustainability
Pershore Group of Colleges	Landbased Industries: Horticulture
Barnfield College with Bedford College	Construction: House-building for the Future
Guildford College of Further and Higher Education	Business: Accounting and Finance
University of Lincoln	Food Manufacturing Technology
Bradford College	Applied Science: Health
Polymer Training Ltd (PTL)	Engineering: Polymers
Bishop Burton College	Landbased Industries: Agriculture

Thanks to all these people for their work on this project, especially all those CoVEs that completed and returned our questionnaire.

Aims and Objectives of the Project

The project aims to address the following:

Project aims
This project will use a number of CoVE case studies to explore the introduction of sustainable development into the vocational curriculum and the organisation.

Project objectives
The project will use CoVE case studies to

- explore with providers the extent to which sustainable development is included in their vocational curriculum
- explore the institutional context within which the CoVE is working and its influence, if any, on the sustainable development agenda.

Contents

Introduction

1. The Department for Education and Skills (DfES) has developed an action plan, the *Sustainable Development Action Plan for Education and Skills*[1], which sets out an ambitious learning agenda for education and training providers. The aim is that providers should themselves operate in a more environmentally sustainable way, and that they should also teach others to do so. The action plan argues that sustainable development (SD) is about achieving economic, social and environmental objectives at the same time. Centres of Vocational Excellence (CoVEs) aim to develop excellent vocational provision that is focused on meeting the skills needs of employers: they can therefore be expected to play a leading role in furthering the 'education for SD' agenda in their vocational specialisms.

2. The CoVE programme was announced in the statement *Colleges for Excellence and Innovation*[2]. The programme is ambitious: its goal is to develop centres of high-quality specialist vocational provision, which work closely with business to more effectively meet the needs of employers and the economy. CoVEs aim to develop the skills and careers of those already in work, and to enhance both the employability of new entrants to the labour market and the employment prospects of those seeking work (including self employment). CoVEs also aim to develop, deliver and maintain high-quality specialist provision across a range of new and traditional occupations. They therefore give employers significant opportunities to develop their workforce and meet skills shortages. They are expected to be innovative in delivering learning that develops both specialist vocational and related general skills.

3. The objectives of the CoVE programme are:
   - to establish 400 CoVEs in the further education and training sector by March 2006: this will create a network of high-quality centres, strategically distributed to take account of local, regional, sectoral and national needs
   - to increase and strengthen active employer/provider engagement: this will underpin, develop and strengthen innovative and flexible approaches to meeting the employers' current and future skills needs
   - to secure enhanced vocational learning opportunities for all learners in the post-16 sector, with a focus on developing employability and career prospects, particularly for those from disadvantaged groups
   - to encourage collaboration amongst providers and to promote the concept of excellence in economically important vocational specialisms.

4. Since the programme began in July 2001 over 260 providers have joined it, through five proposal rounds.

5. SD has substantial implications for all occupations because of their impact on climate change, economic and social development and damage to the natural environment. Farmers, for example, are responsible for producing food that:
   - is healthy and safe
   - uses less agro-chemicals, such as pesticides
   - is cost-effective to produce
   - minimises waste
   - maximises biodiversity
   - takes account of animal welfare and a host of other regulatory legislation.

[1] See http://www.dfes.gov.uk/sd/action.shtml
[2] Statement by the Secretary of State for Education and Employment on the future of education in England, 21 November 2000. *Colleges for Excellence and Innovation*.

The pressures on all occupations to act more sustainably present a major challenge and opportunity for the learning and skills sector[3].

6. The purpose of this report is to assess the contribution that the CoVE programme is making to SD. It considers:
    - the contribution made to SD through the vocational curriculum
    - the impact of SD on the design, development and purchase of new or existing facilities (buildings and equipment)
    - the contribution made to SD through community engagement
    - the influence and role of employers in developing new forms of provision.

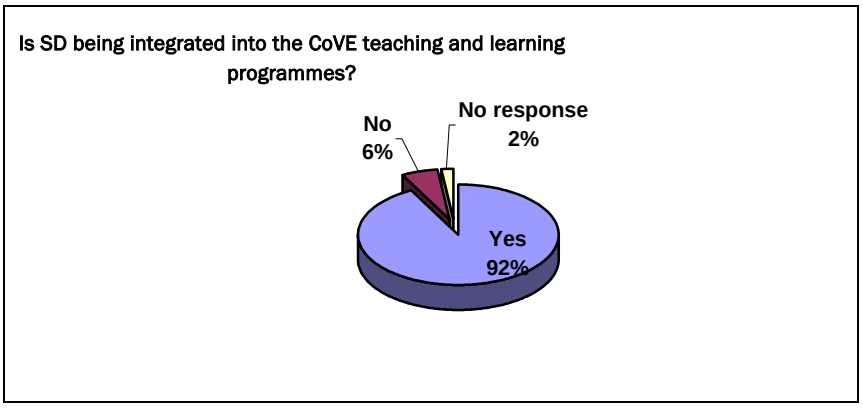
Methodology

7. The report is based on a survey questionnaire (Appendix 1) sent to 260 CoVEs nationally, followed by face-to-face interviews with staff from a selection of CoVEs covering eight specialist vocational areas (see paragraph 15). There is a glossary of terms in Annexe 3.

Survey Responses

8. Fifty-two questionnaires were returned, representing a 20% response rate. In summary, the survey indicated that:
    - 92% of respondents state that SD is being integrated into CoVE teaching and learning programmes (see Figure 1)
    - new facilities are being developed as part of CoVE by 88% of respondents; 86% of respondents state that these new facilities are being developed to a range of internal, national or international environmental standards
    - 85% of respondents state that the CoVE involves the local community in a range of ways, including regeneration programmes and sustainable communities programmes
    - over 63% of respondents involve employers who promote sustainability principles in a variety of ways.

Figure 1: Responses to question 1



[3] Martin S, Cohen J, Martin M (2004). *Opportunities for sustainable development in the learning and skills sector: a policy analysis.* LSDA report. http://www.lsda.org.uk/pubs/ and Yarnit M (2004). *Regeneration and all that: learning and skills and sustainability*. http://www.lsda.org.uk/pubs/

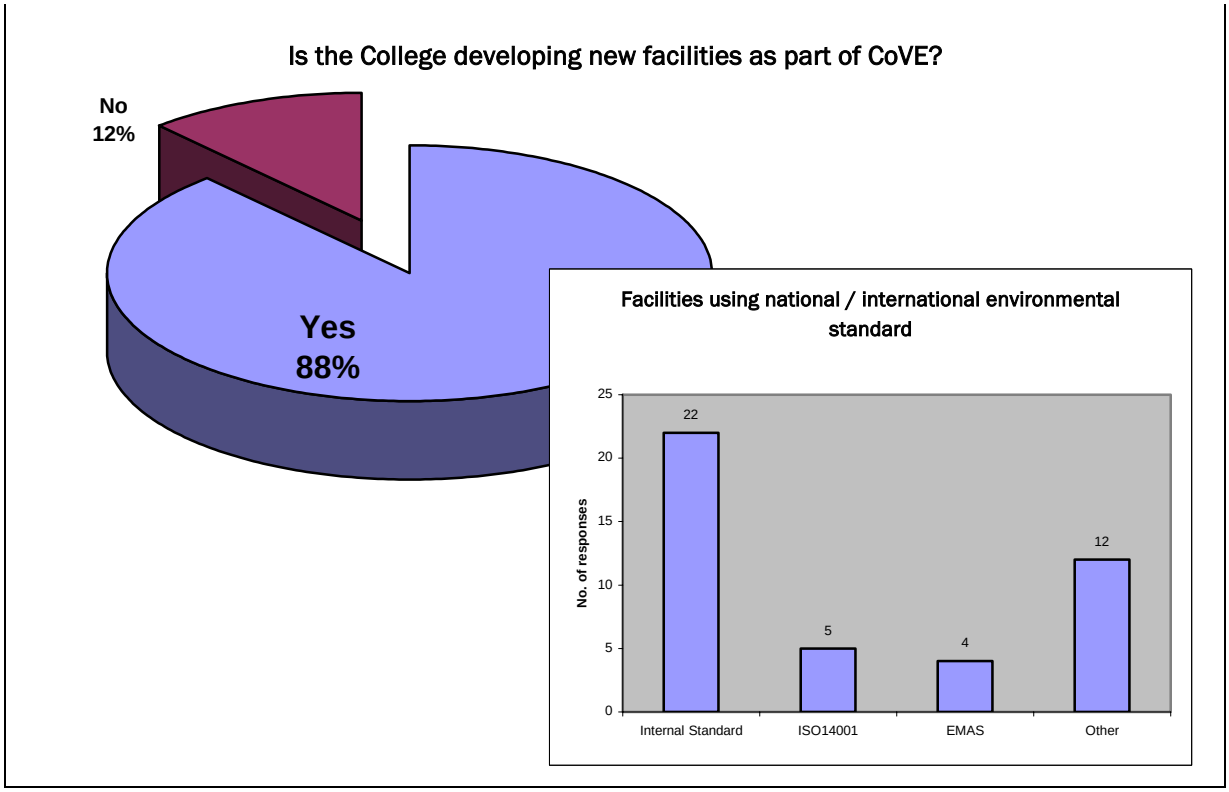
Respondents were asked to provide examples of features of the teaching and learning approach that they would identify as good practice. A number of detailed examples were given. Many of the responses highlighted plans for further development of courses designed with and for employers to meet their needs, and to ensure continuation of the CoVE in the future. Some identified flexible delivery (blended learning) as a key feature, particularly using electronic technologies such as the virtual learning environment (VLE). Others highlighted the ways in which the training ensured that young people, and in many cases a wider range of participants, were equipped with skills and qualifications to meet the local and regional needs of the community. These features are aimed at addressing access issues. Some highlighted progression pathways to qualifications, including foundation degrees, and others identified continuing professional development (CPD) for staff. These examples represent good practice: they also address the economic and social dimensions of SD, which are commensurate with what is expected of CoVEs in terms of the remit set by the Learning and Skills Council (LSC).

9. A number of respondents identified ways of integrating the environmental dimension of SD with economic and social objectives. A sample of such features follows.
    - Use of electronic facilities (ie whiteboards) reduces the number of resources required (eg flipchart pads and pens, paper handouts). Assignments submitted electronically and marked online, including feedback in electronic format, 'practically eliminate paper-based assignments, thus saving substantial amounts of paper' [IT CoVE]. Plans have been made for a water recycling scheme for college facilities, demonstrations and courses for employers on reclaiming water and composting for green waste management, with dissemination to employers [Case Study 2 – Horticulture CoVE].
    - Technology has been purchased that increases recycling capability and a proposal has been made for a living demonstration facility for low-energy processing technology [Case Study 7 – Polymers CoVE].
    - An ICT Networking CoVE has developed a sustainability development model that looks at the involvement and role of the community and region in addressing skills shortages. The CoVE's area of specialism covers a range of industries from catering through to construction, from SMEs to blue chip organisations. This CoVE has realised its responsibility to be at the forefront of SD in advice and consulting services to any industry that requires neutral and expert advice on the regeneration of ICT infrastructures. The CoVE is actively involved in establishing key forums to address skills shortages and develop a curriculum that reflects the needs of the community and the region [ICT Networking CoVE].
    - Sustainable farming methods (Integrated Farm Management) are integrated within every agriculture course to some degree [Case Study 8 – Agriculture CoVE].
    - The impact of food manufacture on the community and the environment is embedded within the curriculum [Case Study 5 – Food Manufacturing Technology CoVE].
    - Central heating appliances are insulated and excess boiler heat is reclaimed [Gas Training CoVE].
    - Cross-college staff development days are organised (eg 'The Sustainability Experience'); a Cross-College Sustainable Development Education Strategy 2003-2006 is in place [Case Study 1 – Construction CoVE].
    - A CD and film of the 'H20 Yorkshire Project' has been produced as part of 'Dissemination of Good Practice in Sustainable Development Education'; SD issues are mapped to three curriculum areas. Project work is disseminated at national and international events [Case Study 6 – Applied Science CoVE].
    - E-learning is being used in two areas of training: the recycling of motor vehicles, and the use of fossil fuel consumption [Automotive CoVE].
    - The SD agenda is promoted in handbooks; clear statements are made that the College and CoVE subscribe to the SD agenda, demonstrate corporate social responsibility (CSR), encourage students to evaluate 'fair trade' movement in relation to a business model and

provide courses, exercises and assignments to promote the SD agenda [Case Study 4 – Accounting and Finance CoVE].

10. Forty-five (88%) of the respondents are developing or have developed new facilities as part of their CoVE. Where new facilities are being developed, most are being designed to meet environmental standards, including ISO 14001[4] or EMAS[5]. Figure 2 indicates the responses received. Of the 12 describing 'Other' standards, two included BREEAM[6] (Building Research Establishment Environmental Assessment Method), a number of others referred to current building regulations, one to automotive safety standards, one to JAR–147[7] and one to IT installation regulations.

Figure 2: Responses to question 2



11. One college described its premises management policy as also including:
- the policy decision to buy low-energy equipment for refurbished premises
- a commitment to promoting responsible use of resources by staff and students
- a decision to support college policies and actions in the management of resources to meet SD agenda.

[4] ISO 14000 is a series of international standards on environmental management. It provides a framework for the development of an environmental management system and the supporting audit programme. The main thrust for its development came as a result of the Rio Summit on the Environment held in 1992. ISO 14001 is the cornerstone standard of the ISO 14000 series. It specifies a framework of control for an Environmental Management System against which an organisation can be certified by a third party.

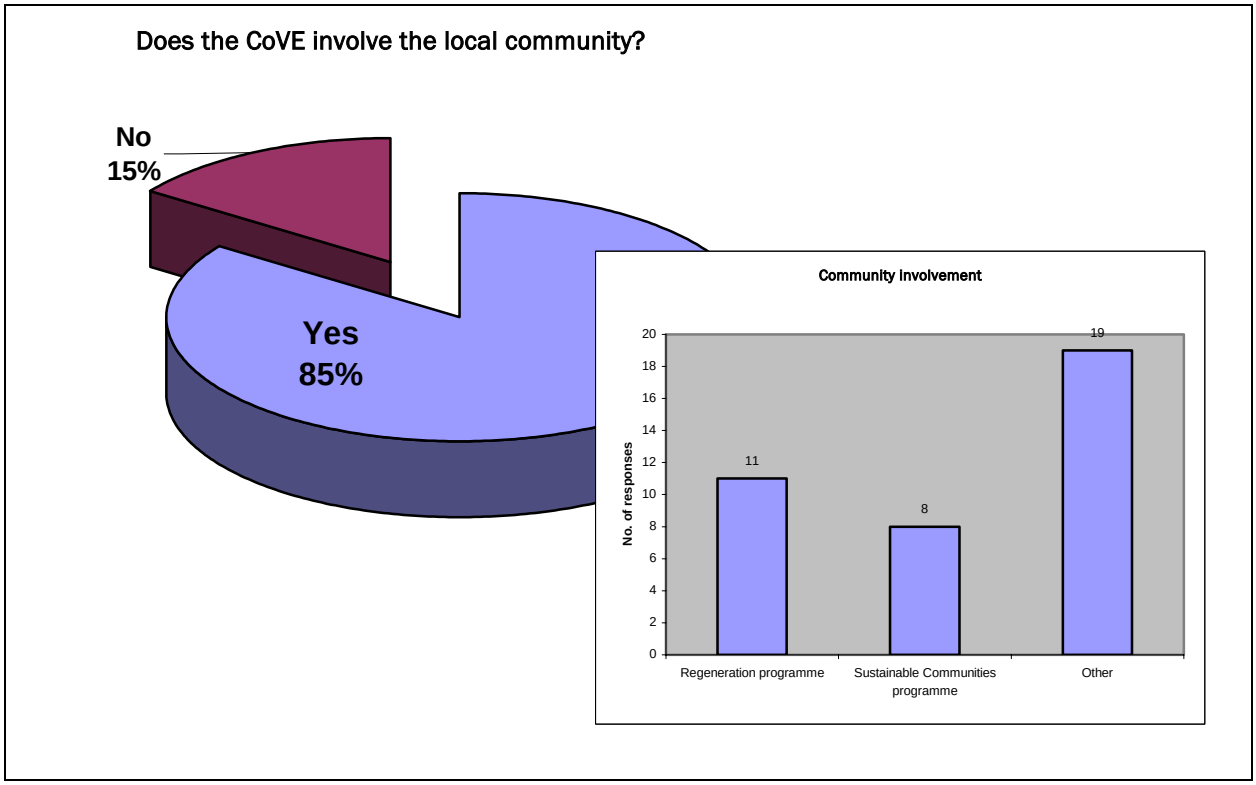
[5] EMAS, the Eco-Management and Audit Scheme, is a voluntary initiative designed to improve companies' environmental performance. It was initially established by European Regulation 1836/93, although this has been replaced by Council Regulation 761/01.

[6] See http://www.englishpartnerships.co.uk/standards.htm

[7] Joint Aviation Requirements.

12. A large proportion (85%) of the respondents indicated that their CoVE engaged with the local community in a variety of ways, as shown in Figure 3.

Figure 3: Responses to question 3



13. Of those who reported 'Other', some described links with local authorities and regional development agencies in respect of economic development, others mentioned the New Deal for communities. Other examples included:
    - an increased flexibility programme – engineering training for school pupils aged 14–16 years and adult learners in the community [Aerospace Engineering CoVE]
    - membership of the Creative Industries Forum [Media CoVE]
    - direct links to local organisations: for example, Learning Disabilities Partnership, Social Care Development Group, Strategic Health Authority, Topss[8] local partnerships and national organisations as well as government initiatives [Health and Care CoVE]
    - Genesis – see Case Study 1 [Construction: Crafts, Professions and Sustainability CoVE]
    - promoting cooperative forms of transport to college among students and staff [Accounting and Finance CoVE].

14. The survey revealed that a high proportion of the employers involved with CoVEs actively promote environmental sustainability through environmental management systems, corporate social responsibility or other sustainability principles (see Figures 4, 5 and 6).

[8]Topss is part of the developing Sector Skills Council: see http://www.topss.org.uk/

Figure 4: Responses to question 4i)

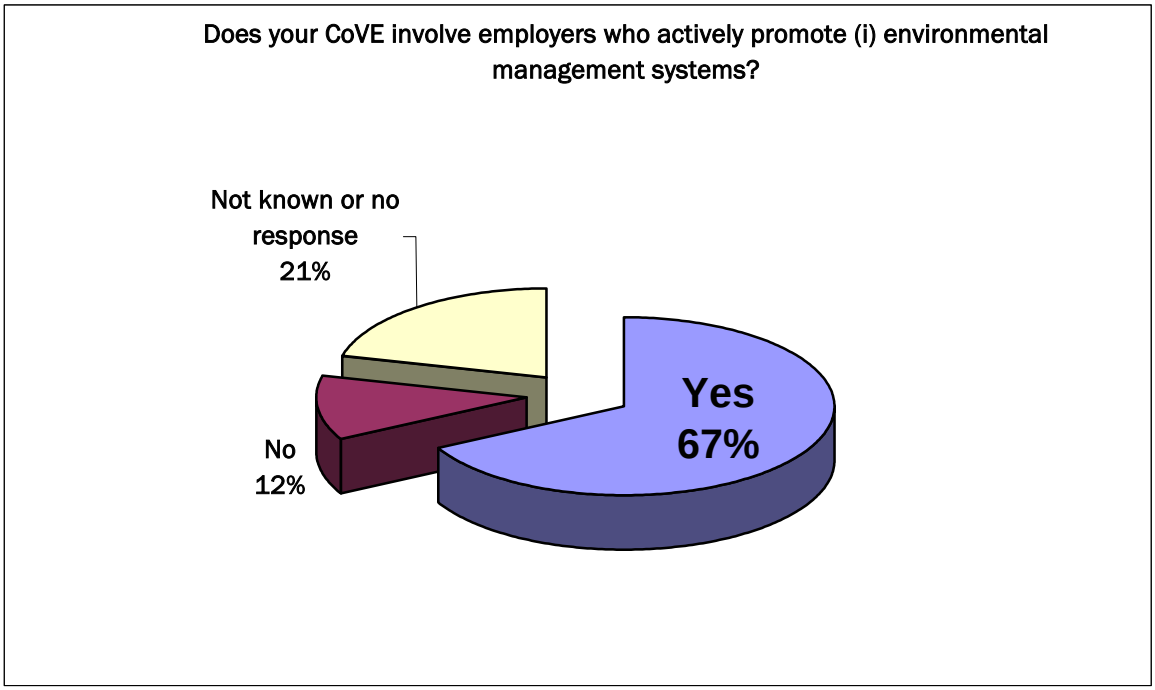


Figure 5: Responses to question 4ii)

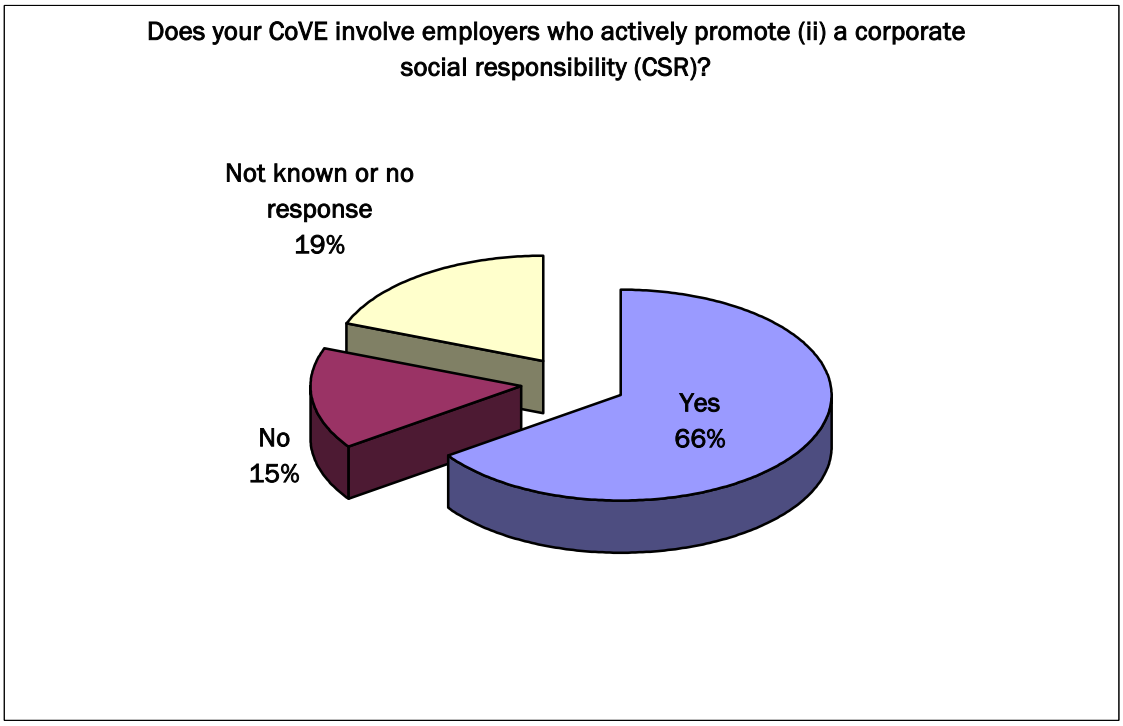
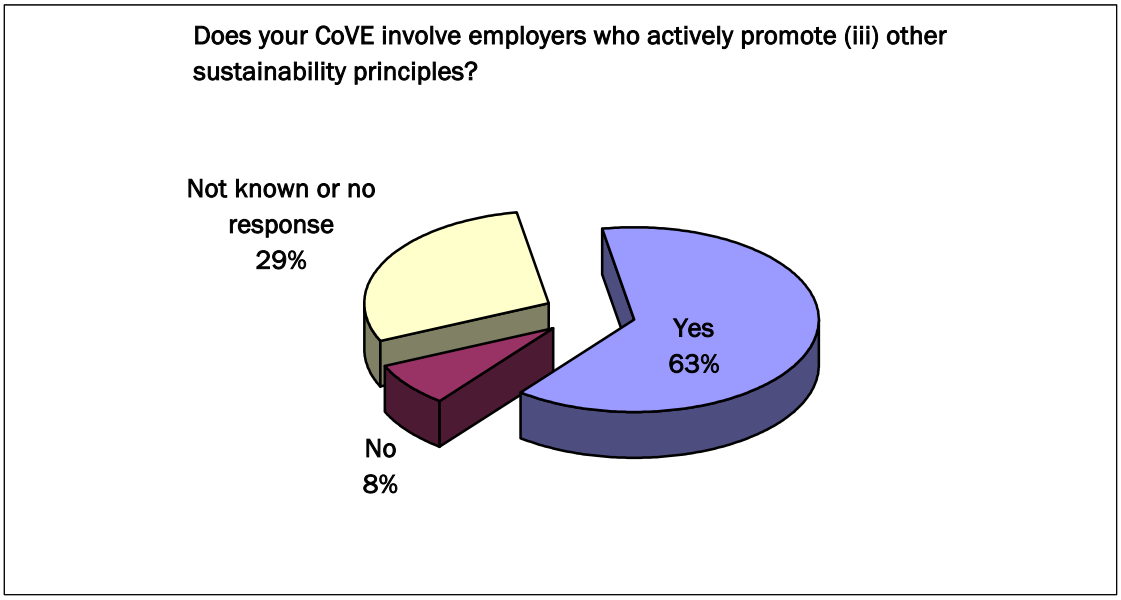


Figure 5: Responses to question 4iii)



Case Study Visits

15. From the survey returns, a number of CoVEs were selected for visiting. Selection was made on the basis of their indicative impact on the four themes identified in paragraph 6 above. Each of these visits allowed a more in-depth analysis of each vocational specialism and provided the basis for eight case studies set out in Annexe 2. The vocational specialisms of the CoVEs visited were:
    - construction crafts, professions and sustainability
    - commercial horticulture
    - house-building for the future
    - accounting and finance
    - food manufacturing technology
    - applied science
    - National Polymer CoVE
    - agriculture.

16. Each of the CoVEs has responded to the issue of SD in different ways and often from different starting points. Interviews attempted to clarify:
    - the main internal and external drivers for change
    - the actions and impacts of change
    - the role and impact of employers.

17. In nearly every case, the influence of environmental legislation is seen as a major driver for each sector of the economy. In the case of construction it is the impact of more stringent building regulations and the impact of the sector on climate change that are major drivers. In addition, however, the social driver of more affordable and energy-efficient homes has been a major factor in developing new facilities and in prompting curriculum reform.

18. Several CoVEs are part of a whole institutional change process based on the principles of SD. In three examples, the institutions have developed a comprehensive SD strategy and action plan. In one case, the strategy and action plan focuses solely on a faculty or school, but one of its objectives is to influence change in the institution as a whole. In other CoVEs the driver is more

pragmatic and is based on the immediate skills needs of a particular vocational sector (eg the needs of employers and immigrant labourers in the food industry).

19. All the CoVEs visited are reviewing or have already reviewed how their new or refurbished facilities could meet more rigorous environmental standards in terms of energy costs, water use and resource use more generally. Budgetary constraints have meant that many of the development programmes could not fully meet all their environmental targets as the staff would have wished: 'How can you be green when you are in the red?' was one memorable quote. In several instances the purchase of new equipment had been significantly influenced by the emerging SD agenda. This included new equipment to enable more efficient use of recycled materials, and new ICT hardware and software to reduce paper use and reduce travel by facilitating more home-based learning.

20. Some CoVEs are making a significant contribution to the communities they serve through a participative and inclusive approach with the key stakeholders. In particular, the emphasis placed on partnership and participation and communities of practice[9] is a strong feature of the CoVEs involved in food and farming. Much of this is in line with the Government's commitment to developing learning communities[10] by strengthening community involvement in learning. It is also a significant contributor to the development of sustainable communities as set out in the Egan Review (2004)[11].

21. A major focus of each visit was to identify and categorise some of the new skills emerging from the links between employers and providers. In all cases it was possible to identify a range of emerging generic skills that influence the way employees will need to think about their roles and responsibilities in the context of SD. These include:
    - systems thinking and practice (the interconnectedness of the ecological, physical, cultural, economic and political systems)
    - the relationship and dependency of the vocational sector and the natural resources on which it depends
    - international dimensions of the impact and influence of the vocational sector
    - decision-making in an uncertain world
    - engagement with stakeholders and their role in developing learning communities.

22. Within the vocational specialism there is mounting evidence of new technical and vocational skills linked directly to the SD agenda, with the added benefit in many cases of reducing production costs. In farming, for example, the emphasis is on minimising:
    - waste
    - the use of non-renewable resources, such as oil/diesel and agro-chemicals
    - applications of nitrogen fertiliser, because of its contamination of water supplies.

    More fundamentally, this is leading to the teaching of new skills in:
    - remote sensing
    - precision farming using global positioning systems (GPS)
    - integrated farm management, focusing on minimising resource use and waste

[9] 'Communities of practice' refers to groups of people in the same occupation, such as farmers, reflecting on current practice, adopting and developing new practices and sharing good practice. By participating in these communities, the occupation defines what constitutes competence in a given vocational context (ie a reliable doctor, a talented engineer or teacher, and so on).
[10] DfES (2003). *21st century skills: realising our potential*. Paragraphs 7.18–7.25. See http://www.dfes.gov.uk/skillsstrategy/
[11] Office of the Deputy Prime Minister (ODPM) (2004). *The Egan review: skills for sustainable communities*. See http://www.odpm.gov.uk/eganreview

- systems thinking and practice, linking production to the food chain and human health and welfare
- stakeholder engagement and communities of practice.

Similarly in other vocational areas – such as applied science – the interconnectedness of ecological, physical, cultural, economic and political systems is stressed: for example, through the application of sustainability principles to the purification of water using reed-bed technology.

In the training of employees in the polymer industry, there is emphasis on the application and use of rapid prototyping equipment and processes and new sandwich-moulding techniques, the aims being:

- to enhance resource-use efficiency
- to increase the use of recycled polymers
- to design new products and services with sustainability principles in mind.

In the food industry there is a growing emphasis on sensory science and the use of taste panels (stakeholder engagement) in new product development.

Conclusions

23. This report offers an insight into how the national CoVE programme is beginning to address the integration of SD into a number of vocational specialisms. It also highlights how many of the centres are using their capital funds to design and purchase more environmentally sustainable buildings and teaching and technical equipment. The drivers for change and the stages of development vary widely, but what is evident is that there are real and tangible success stories where SD is being used to create new vocational programmes. These programmes are, in turn, creating new and deeper opportunities for engagement with employers.

24. Making SD tangible is a significant challenge for the learning and skills sector – not least in bringing the concept down to earth for a wider audience of key stakeholders (employers, trainees and the public more generally). This study has found that in several CoVEs the language and practice of SD is implicit but not yet explicit. Consequently, an issue for CoVEs and Specialist Development Groups[12] (SDGs) is how they might best communicate and spread emerging best practice. Some providers are inculcating the values and learning that are essential if the private sector is to take a path that protects the future – both by using resources more efficiently and meeting economic, social and environmental needs. This practice needs to become widespread.

25. An important element of 'making SD more tangible' is the process of defining and categorising the new and emerging generic and technical skills that will be required in all occupations. This is no simple task and has no discernable end-point, but it is nevertheless critically important in maintaining the relevance and credibility of the vocational educational training system in the UK. Sector Skills Councils have responsibility for determining the skills needs for their industry and the skills trends identified in this report are critical to their work.

26. This report reveals that CoVEs are beginning to make a valuable contribution to the integration of SD into a number of economically important vocational areas.

[12] SDGs were set up by the LSDA to support and promote dissemination of good practice within the vocational specialism (eg in engineering, management and finance, etc).

Appendix 1: CoVEs and Sustainable Development Questionnaire

We are interested to learn how your CoVE(s) are responding to the sustainable development agenda (SD) in the following broad areas:

1. How are learners being equipped with the skills, knowledge and values to be active citizens in creating a more sustainable society?
2. How are your facilities (buildings, land, etc.) being managed to meet high environmental standards?
3. How are links between local communities helping to build capacity to deliver sustainable communities?
4. How is good practice in sustainable development from employer engagement being used to enhance demand-led provision?

1	Is sustainable development being integrated into the CoVE's teaching and learning programmes?	Yes	No
	Are there any particular features of the teaching and learning approach which you would identify as good practice?		
2	Is the college developing new facilities as part of CoVE?	Yes	No
	If Yes, are these new facilities being designed/developed to any national / international environmental standard?		
	An internal standard □		
	ISO 14001 □		
	EMAS □		
	Other (Please specify) □		
3	Does the CoVE involve the local community?	Yes	No
	If Yes, is the CoVE part of:		
	A regeneration programme □		
	A sustainable communities programme □		
	Other community programme (please specify) □		
4	Does your CoVE involve employers who actively:		
i)	Promote environmental management systems?	Yes	No
ii)	Promote corporate social responsibility	Yes	No
iii)	Promote other sustainability principles	Yes	No
Please give further details, together with any further information you wish to provide.			

Please confirm your contact details:

Name:	
Position:	
Organisation:	
Name of CoVE:	
Address:	
Tel:	
Fax:	
E-mail:	

We very much appreciate your completing this questionnaire.

Please return to:

Sarah Davies
LSDA–CoVE Coordinator

Appendix 2: Case Studies

The case studies that follow demonstrate the work that CoVEs are undertaking in the area of SD. All CoVEs will be delivering a development plan that aims to meet the CoVE criteria and outcomes (http://cove.lsc.gov.uk/cove). These include a strong emphasis on level 3 learning, especially for those in work, and increasing collaboration with, and flexibility for, employers.

CASE STUDY 1

SOMERSET COLLEGE OF ARTS and TECHNOLOGY
Construction: Crafts, Professions and Sustainability CoVE

Context

Somerset College of Arts and Technology (SCAT) is a leading provider of further and higher education in Somerset. Its CoVE for 'Construction: Crafts, Professions and Sustainability' is situated in the construction teaching area. Construction is one of the biggest industries in Britain. It contributes approximately 10% to the country's gross domestic product (GDP) and employs 1.5m people. Such an immense economic operation carries a large social and environmental responsibility. For example, construction consumes some 260m tonnes of primary aggregates per year, creating around 70m tonnes of waste – half the UK's total – much of it ending up in landfill. Buildings, once completed, go on to account for a full 50% of total energy consumption.

The construction and technology teaching area offers a wide range of courses in brickwork, carpentry, joinery, electrical installation, painting and decorating, plumbing and professional courses. It also offers to the industry a growing schools link programme and a programme of short courses. From this excellent foundation, the Genesis Project was conceived as a result of a Higher National Certificate (HNC) student's project.

The Genesis Project

The Genesis Project is the centrepiece of SCAT's CoVE. It is a £2.5m SD resource centre designed primarily to promote sustainable construction, but with the overall aim of promoting sustainability in all its forms. The project was launched in February 2004 by Kevin McCloud (presenter of the TV programme 'Grand Designs') at 'Homes for Good' – the south-west region's first major 'green' fair. Building of the centre for sustainable construction will be underway in 2004. It will consist of several pavilions built from environmentally-friendly materials such as straw, timber, earth and clay. It will also house a perspex water pavilion, which will demonstrate how rainwater can be harvested, used and conserved through recycling and will incorporate sustainable drainage systems. The aim is to create an exciting new venue for teaching and learning new forms of sustainable construction, based on leading edge developments from industry leaders such as Architype Ltd, James Nisbet and Partners, Robert Bray Associates, and many others.

The centre will act as a one-stop centre for all aspects of sustainable construction education and training and product demonstrations and advice. It will give students, the industry and the public the opportunity to learn about:

- innovative ways of building new structures
- insulation
- energy conservation
- alternative energy sources (solar and wind power)
- waste management
- water use and conservation
- sustainable drainage
- composting
- the use of more sustainable building materials.

The south-west region has a booming construction sector and is predicted to need a further 41 000 skilled craftsmen over the next five years. Clearly, if they can put into practice the goals of sustainability this will not only enhance the financial performance of the construction sector, but will also be good for the planet!

The CoVE will benefit from a new foundation degree in Sustainable Construction, in partnership with the University of Plymouth. It has already developed some excellent links with the local/regional construction sector and sees the CoVE enhancing its national link with the Construction Industry Training Board (CITB) – Construction Skills (the Sector Skills Council) and other agencies, such as Wessex Water.

There is strong and informed leadership for this project from senior management and, uniquely, it is set within a college-wide SD education strategy, which sees the Genesis Project as promoting sustainability in all its dimensions. The College has set an ambitious target to integrate SD in all its programmes for learners by 2006. It has successfully piloted a foundation certificate (NCFE) in SD for catering and construction link students from 2003.

CASE STUDY 2

PERSHORE GROUP OF COLLEGES
Landbased Industries: Horticulture CoVE

Context

Pershore Group of Colleges has been one of the leading proponents of sustainable land use for some considerable time[13]. It operates on two main campuses: one is in Worcestershire (Pershore) and the other in Herefordshire (Holme Lacy). It also has a number of specialist centres in Birmingham. It offers a rich variety of courses in agriculture, horticulture, food and drink, leisure and recreation, management, retail, sport and garden design, from short courses to postgraduate level.

Pershore is one of only two centres in the UK with CoVE status in Horticulture. This status recognises the 50-year history of the college in preparing horticultural students for work in all areas of the horticultural industry. Its horticultural facilities are based on four separate trading units:

- a plant nursery (8.3ha)
- computer-controlled glasshouses for flower and salad crops (1ha)
- a retail plant centre
- landscaped gardens and conservation area (15ha).

The Horticulture CoVE

Commercial horticulture is no different from any other business in that it requires substantial inputs of natural resources (soil and water) and energy (sun, oil or gas for heating) and manufactured resources (polythene tunnels, containers and irrigation pipes, all of which are derived from oil). Its dependency on these resources is a cost in financial terms but is also, increasingly, having a global impact. Even in the UK, at certain times of the year, water is becoming an increasingly scarce resource. Global consumption of fresh water is doubling every 20 years, 65% of it being used by industrial agriculture.

The CoVE in horticulture has at its centre a water conservation project. Historically, the commercial horticultural facilities abstracted water under licence from the nearby River Avon. However, with the increasing focus on the sustainable use of natural resources, along with increasing concern over food safety (river sources of water can contain high levels of faecal coliform bacteria, which can lead to food poisoning) the college decided to focus on an entirely new system of water collection for the nursery. This new system is essentially a roof water harvesting and recycling system and installation costs will be in the region of £100 000. The rainwater harvesting system includes the nursery tunnels and the new learning resource centre and amounts to a total area of 3500sq m. The college currently estimate that in the peak summer months they use about 100cu m of water per day. If this were mains water, it would cost in the order of £0.90/cu m and river water costs £0.10/cu m. Hence there is a considerable financial saving in the new system.

The new system is attracting substantial interest from local businesses: the CoVE is closely linked with the Midlands Region Nursery Stock Growers Association, comprising some 25 large businesses employing, in total, over 1000 people. To date, all the workshops offered by the college have been well attended. Water management and conservation has become a significant component of the new foundation degree in Commercial Horticulture.

In addition, the initiative has led to further sustainable resource management projects, including:

- recycling plant containers for the Growers Association members
- composting and green waste management
- peat-free growing

[13]See http://www.projectcarrot.org/

- hosting a farmers' market.

Also, the nursery has purchased an electric vehicle for picking nursery orders and dispensed with the use of a diesel tractor. Further developments include a new reservoir with reed-bed filtration and the development of a sustainable horticulture training programme for existing professionals in the industry[14].

[14] See http://www.pp4sd.org.uk/

CASE STUDY 3

BARNFIELD COLLEGE with BEDFORD COLLEGE
Construction: House-building for the Future CoVE

Context

Housing is a basic human need, fundamental to our social and economic well-being. But housing, and buildings in general, soak up massive amounts of energy and contribute significantly to the production of greenhouse gases – and hence to climate change. It is estimated that buildings contribute 50% of greenhouse gas emissions, compared with 25% for transport. Energy efficiency, however, remains a peripheral concern to many homeowners and businesses. Also, in many parts of the country there are people who are vulnerable to poor housing – for example, people from black and minority ethnic communities, those with disabilities or with mental health needs. Overcrowding, insufficient support services and inadequate accommodation, all of which are SD issues, can have distressing effects on individuals and families.

The House-building for the Future CoVE

This CoVE is attempting to address some of these issues from a construction perspective. The CoVE is set in the context of increasing demand over time for housing, driven primarily by demographic trends and rising incomes. Yet in 2001 the construction of houses in the UK fell to its lowest level since the Second World War (Barker 2004[15]). In addition, the number of social houses built in the UK fell from 42 700 in 1994/5 to around 21 000 in 2002/3. Consequently, housing as a basic human need is increasingly seen as a national priority to overcome the backlog in supply and to meet the growing needs of a wide spectrum of the population. Estimates vary, but it is suggested that in excess of 150 000 private and social sector houses are needed per year for the foreseeable future. Recent statistics suggest that in 2002/3 there were 195 000 starts and 183 000 completions, which is a significant increase in activity compared with recent years.

But more housing doesn't mean more sustainable housing! The Barnfield and Bedford College CoVE is seeking to provide training for more environmentally and socially responsible construction. Both colleges offer foundation, craft and technician (HNC) level provision in bricklaying, carpentry, electrical work, plumbing and paintwork. They are also successfully offering school 'taster' programmes. In addition, Bedford College offers a variety of construction-related courses for the 14–16 years age group and it has achieved Beacon status for its work with schools in Bedfordshire. The environmental aspects of their training courses include an increasing emphasis on platform timber-frame building, thin-joint brickwork, solar heating and heat pumps.

Platform timber-frame building originates in Canada and Scandinavia and is more efficient in terms of speed of erection, but also has insulation values 50–60% greater than traditional brickwork construction. This development is in close collaboration with CNC (Biggleswade), a construction company specialising in this form of more sustainable housing. CNC is currently training NVQ assessors, with the help of the CoVE, to meet the new skills requirements of the new techniques involved. The CoVE is also prioritising thin-joint masonry. This new technology has evolved successfully in both Holland and Belgium and offers greater build quality in terms of thermal performance and air tightness of buildings, both of which are major issues for the UK construction industry. In addition, this form of construction reduces waste significantly, because the aircrete blocks used can be easily and accurately cut, sawn and worked on

[15] Barker K (2004). *Review of housing supply: securing our future housing needs.* See http://www.hm-treasury.gov.uk and select Consultations and legislation, Full Index of Consultations.

site. The precision cutting of blocks for use with thin joint mortar allows greater utilisation of the blocks, which can substantially reduce site wastage[16].

The CoVE is currently working with over 90 local employers, both large and small (eg Neville Construction Group Ltd and Jarvis Construction UK Ltd) and hence hopes to influence and inform a wide range of building contractors. On the social sustainability side, Barnfield is actively working with the Asian communities in Luton and is part of a partnership to develop a self-build programme for 20–30 individuals in the former grounds of Luton Football Club. Hence there is a strong regeneration and sustainable communities focus in their work. Barnfield has Beacon status and currently enrols over 2000 students in construction-related programmes. There are also growing links between the plumbing CoVE at Bedford and the joint construction CoVE, which could lead to some new initiatives in grey water systems and condensing boiler systems, which are more energy-efficient and resource-efficient systems.

[16] See http://www.citb.co.uk/futureskills/default.asp

CASE STUDY 4

GUILDFORD COLLEGE OF FURTHER AND HIGHER EDUCATION
Business: Accounting and Finance CoVE

Context

A growing awareness among consumers, producers, employers and competitors is prompting an ever-increasing number of businesses to take up the challenge of SD. This is because there is now a realisation that SD is an integral component of doing business and can lead to additional revenues and considerable cost savings. In addition, banks and other financial services are recognising their respective roles in terms of their direct impact on the environment (eg energy use, waste production) as well as their intermediary role in investing in new more sustainable products and services.

Accounting and financial management is a key activity of any organisation, large or small. Accountancy not only assesses the assets of an organisation but also acts as an aid to management in planning, decision-making and control. Those working in the accounting and financial services sector are increasingly being subject to a wide range of environmental, social and economic trends. For example, ethical banking and investment is growing at an annual rate of about 30% (Ethical Purchasing Index, 2003[17]). Lapses in accountancy and auditing procedures have increased the rigour with which the professional codes of conduct are monitored and regulated by the accountancy profession itself and by the Securities and Exchange Commission. In addition, there is a wide range of national and international initiatives that recognise that SD is a fundamental aspect of sound business management. In this wider context, organisations need to consider not only their financial performance but also:

- how they manage intangible assets
- their influence on the wider economy
- their social and environmental impacts.[18]

The Accounting and Finance CoVE

This CoVE is increasingly focusing its activities on the emerging SD agenda, and as a consequence has developed an SD strategy and action plan to promote it. The SD strategy is fully supported by the School of Business, Computing and Professional Studies, and seeks to support and widen this agenda both in the college and in the local community. The actions proposed are wide ranging and include:

- developing the virtual learning environment (VLE) through greater home working
- using the software program *Blackboard* to eliminate the need for noticeboards and other paper-based communications
- developing short full-cost courses in business (especially in relation to payroll, bookkeeping and accounting skills)
- developing cross-college provision in business and finance through the VLE process, for hairdressing, engineering and other vocational provision.

The CoVE is also refurbishing its business centre as part of the capital programme and will offer high-quality IT and meeting room facilities with interactive whiteboards, wireless networks and laptop computers.

One of the school's high profile activities is through the UK Career Academy Foundation (UKCAF) and its Academy of Finance. This initiative originated in the USA in 1984 and currently has over 16 000 students

[17] The Co-operative Bank (2003). *Ethical consumerism research report. Ethical purchasing index 2003.* See http://www.co-operativebank.co.uk and click on Ethics in Action, Ethical Policy, Ethical consumerism research report (accessed 17 March 2004)

[18] External environmental impacts might include some or all of the following: contamination of ground water, traffic congestion, poor urban air quality. Social impacts might include staff terms and conditions and/or support/volunteers for local community activities.

participating in 252 schools in 39 states. In the UK, the Academy currently operates in Lewisham College, Guildford College and Sir George Monoux Sixth-Form College. From September 2004, 10 new centres will be joining the UK Academy of Finance network.

The Academy of Finance provides a two-year programme: its objective is to widen participation in specialist financial services courses aimed at those seeking a career in accountancy, financial planning, banking and insurance. This course has a strong emphasis on the ethics of business and provides up to two months' paid work experience in the financial services field. The UK advisory board for the Academy includes members of Citibank, British American Tobacco, BP, the Financial Services Authority (FSA) and AstraZeneca. The College has good links with city financial institutions and with the conservation charity WWF (UK) Ltd.

Context

The food and drink sector is the largest single manufacturing industry in the UK. It employs some 0.5m people directly, and 3.4m when taking into account the whole food chain and ancillary industries. The industry is worth £67bn nationally, accounting for 15% of the total manufacturing sector. The food and drink industry buys two-thirds of all the UK's agricultural produce. In the East Midlands regional economy, the food and drink sector accounts for 16.9% of GDP and 17.5% of all employment (nearly 42 000 employees work in this sector within the region) and is a key sector in the local and regional economy. Furthermore, the sector is forecast to grow significantly over the next decade.

The industry as a whole has a large proportion of SMEs, as well as a number of very large multinational businesses; this too is reflected in the East Midlands region. Over half of the UK food processors have operations in Lincolnshire, sourcing vegetables and produce from local growers and supplying the major supermarkets. Food and drink is the biggest spending category. In 2003, consumer expenditure on food and drink totalled £146.2bn, representing 21% of UK national consumer expenditure.

The unemployment rate for the East Midlands area is low (4.5% compared to 5.2% nationally). Within the immediate area surrounding the CoVE, unemployment is 1.5% – resulting in high staff turnover and constant demand to upskill an unskilled workforce and multiskill existing personnel. Increasingly, and especially over the last two years, migrant labour is filling the gaps: this raises issues concerning language, cultural differences and relations with local communities.

SD is one of the key challenges facing society in the 21st century and, in supplying the world's population with 'the staff of life', the food and drink industry lies at the heart of sustainability. The food industry is subject to a wide range of issues within the context of SD. The following issues, among others, need to be addressed through a SD framework:

- food safety, diet and health
- consumer trust
- contamination through use of pesticides and other agro-chemicals
- resource usage: for example, water for processing and packaging materials
- energy consumption and CO_2 emissions through processing and transportation
- low wages, high staff turnover and recent reliance on large numbers of migrant workers.

The Food Manufacturing Technology CoVE

This CoVE is located in rural South Lincolnshire at the Holbeach Campus of the University of Lincoln, where it has developed strong links with many of the major food and food-related companies in the area. Its objective is to address the severe skills shortage faced by the industry and support the future development and competitiveness of the sector within the East Midlands. Large companies such, as Geest Foods Ltd, Bernard Matthews plc, George Adams and Sons, Hazelwood Prepared Meals, and many local SMEs work in partnership to develop relevant vocational training at varying levels, extending from entry level to higher education courses. They currently support over 2500 part-time learners from across many sectors of the food industry, including:

- food technology
- new product development
- quality assurance
- supervisory management training
- support for language development for foreign nationals
- basic skills.

There is recognition that the infrastructure needed to support ethnic workers does not exist and this presents a major social sustainability issue for the community. 'Skills for life' programmes, which forge strong links with employers, are being developed and delivered to increase managers' and supervisors' awareness of cultural differences and to enhance the language skills of employees from ethnic minority groups. This is an explicit response to the social SD issue, and recognises that such groups are likely to provide the long-term labour force for the industry. The CoVE is extending its stakeholder engagement with the local community in an imaginative way, by recruiting and training for the food-tasting panel in support of new product development. Partnership working with local schools is aimed at increasing the number of young people entering the industry, and delivers GCSE courses in Food Manufacturing, among others, through the Increased Flexibility programme.

The CoVE is involved in partnership working with Lincolnshire Development and South Lincolnshire Food Forum, set up to consolidate a food cluster at the Holbeach Campus and form a regional centre of excellence. The college also engages with its Employer Advisory Committee and a growing network of SMEs to identify training and business support needs. CoVE capital funding will be used to equip four specialist laboratories with state of the art equipment, including a food microbiology lab, a chemistry, analytical and new product development facility and a practical food-processing lab.

Courses and seminars cover environmental issues facing the industry, such as waste minimisation in product development and energy efficiency in buildings and production management, and aim to ensure compliance with a wide variety of regulatory standards.

CASE STUDY 6

BRADFORD COLLEGE
Applied Science: Health CoVE

Context

There is no single science industry. Science-based industries include:

- engineering (particularly electrical and instrumental engineering)
- geology in the extraction industries
- materials science in the metals and plastics industries
- food science in the food industries.

In addition, applied science includes the paramedical and life sciences (such as pharmacy, pharmacology, dietetics, medical laboratory science and various interdisciplinary subjects, including environmental science and biotechnology).

One example of a science-based industry is the water industry. It supplies services to more than 20m properties – the vast majority of the UK population. It has a turnover of more than £7bn a year and assets that include 1000 reservoirs, over 2500 water treatment works and 9000 sewage treatment works. The industry invests more than £3bn per year in England and Wales and directly employs more than 27 000 people; indirectly it provides jobs for many more in construction, environmental consultancy and IT.

The CoVE in Applied Science[19]

This CoVE focused its activities relating to SD on developing curriculum and experiential learning opportunities in the purification of water. It developed highly innovative and challenging material in collaboration with a major international environmental consultancy, Oceans-ESU[20], which has expertise in reed-bed technology for water treatment. The CoVE designed new materials for three different Advanced level subjects:

- AVCE (Advanced Vocational Certificate of Education) Science
- AS/A Geography
- AS/A Environmental Science.

The curriculum development process focused on the development of sustainable technology solutions to mitigate problems of water pollution. Consequently, reed-bed technology[21] was explored as a more sustainable approach to water treatment than conventional chemical treatment. An important strategic context was the link with the Yorkshire and Humberside regional economic strategy. This strategy aims to encourage businesses to exploit the opportunities presented by the need to tackle key environmental, social and development concerns by harnessing the regional expertise in science and technology.

The AVCE Science is a unit-based programme. Unit 1, entitled 'Working with a Service Provider' offers an assignment-based activity focusing on investigating science at work and on a report on the service provider. The reed-bed study involved major fieldwork at ICI Billingham and smaller local sites operated by Transco. The report included a wide-range of science-related material, covering quality control, employment trends and effects on the local community. Hence students were able to participate in a systemic process involving a major service industry and its environmental and social impacts and look in detail at ways in which applied science can mitigate the more widely used applied chemical and microbiological treatment of water. Key competencies included:

[19] This was one of the first CoVEs.
[20] See http://www.oceans-esu.com/overview/index.cfm
[21] See http://www.oceans-esu.com/solutions/aboutreed.cfm

- systems thinking and practice
- links between natural and man-made systems
- international dimensions to water supply and treatment.

The effectiveness of this approach has been reflected in substantial improvements in student performance and grades achieved in AVCE Science.

CASE STUDY 7

POLYMER TRAINING LTD (PTL)
Engineering: Polymers CoVE

Context

PTL is an international centre for training and education in the polymer industry. Polymer is the generic name given to natural and synthetic substances made up of very large molecules, which are multiples of much simpler chemical units. Synthetic polymers exist in a variety of physical and chemical formulations and permit an amazing variety of industrial applications, such as fibres, plastics, synthetic rubber, coatings and adhesives.

One of the most widely used polymers is polyvinyl chloride (PVC), which is manufactured from oil and salt. To become the versatile material that it is, with its multitude of uses, the PVC has to be combined with a wide range of additives, including stabilisers, plasticisers, colouring agents and flame retardants. In the majority of applications, PVC is used in a rigid form, but it can also be made pliable by the addition of plasticisers (most commonly phthalates). Current worldwide production of PVC exceeds 20m tonnes; European production is over 6m tonnes.

The benefits of PVC include:

- excellent resistance to water and gases
- mechanical strength combined with a light weight
- resistance to chemicals
- inherent non-combustibility
- good electrical insulation properties
- versatility.

It is used to make pipes, film, bottles, flooring, coatings, packaging, windows and doors, etc. Pipes and fittings make up about one-third of its uses in Europe.

PVC, like some other polymers in general use, is now a highly controversial material[22]. The main concerns are:

- the release of toxic substances, especially organochlorines, during its manufacture, use and disposal
- the environmental impact of the many additives to PVC
- problems of recycling and/or disposal.

Yet PVC is the best material so far discovered for many purposes – and particularly for medical applications.

The National Polymer CoVE

This CoVE serves the training needs of some of the 280 000 people employed in the industry. In the West Midlands alone the industry is estimated to be worth £16–19bn and employs 30–35 000 people. The industry is facing extremely competitive conditions with a contraction of the UK industry in recent years of nearly one-third and strong import penetration from Eastern Europe and China. In addition, there is greater automation occurring within the industry. This CoVE is contributing to the development of a more sustainable industry, largely through technological change and innovation. This includes forging links with companies that are developing new forms of rapid prototyping machines and rapid retooling, which reduces waste and energy requirements and shortens the lead-time for bringing new products to market. New equipment, processes and technology also permit new product design, with higher

[22] Greenpeace (1997). *PVC: The Poison Plastic – The PVC Lifecycle: Dioxin from Cradle to Grave.*

proportions of recycled plastic materials. Furthermore, there is a strong emphasis on new design and development in healthcare, automotive and aeronautical products and fuel cells.

The CoVE is part of a wider partnership, the Polymer Cluster, coordinated through the University of Wolverhampton, which is designed to facilitate knowledge transfer. It supports suppliers and producers in the development of more cost-effective ways of using polymers and effectively addresses legislation and regulation in energy reduction and recycling. The CoVE is also part of a national initiative to develop a foundation degree in materials processing in conjunction with eight universities.

CASE STUDY 8

BISHOP BURTON COLLEGE
Landbased Industries: Agriculture CoVE

Context

British farming contributes £7bn per year to the UK economy and directly employs 600 000 workers (if seasonal and part-time employees are included). It supplies the bulk of the food in the UK food chain, which is worth £57bn per year and employs 3.3m people. Farming has also shaped the physical structure of our landscape, upon which rural tourism is based, and is a crucial contributor to biodiversity and wildlife in a variety of habitats. Yet farming is in crisis. Some characteristics of the current situation include:

- low farm incomes
- hardship created by Bovine Spongiform Encephalopathy (BSE) and Foot and Mouth disease, which resulted in a ban on exports
- the high cost of new animal welfare legislation
- the introduction of genetically modified (GM) crops
- public concerns about food safety and the environment.

Against this background, the fundamental question of how to achieve a sustainable agricultural and land-use system has to be addressed. This CoVE aims to contribute to the objective of 'developing a sustainable modern, diverse and adaptable farming industry, working in partnership with the rest of the food chain'[23].

The Agriculture CoVE

A central theme of this CoVE is the emphasis placed on partnership with farmers, growers, food processors and key environmental and community agencies, such as the Royal Society for the Protection of Birds (RSPB), Linking Environment and Farming (LEAF) and Farming and Countryside Education (FACE). Many of the activities are coordinated through the 'Forward Farming'[24] initiative, which is funded by the Department for Environment, Food and Rural Affairs (DEFRA). The activities are designed to test the effectiveness of demonstration farms in England using business and environmental benchmarks to measure progress.

The project also explores how farmers can integrate and form closer links with the wider rural community and economy. Often, this may be through showcasing best practice that demonstrates how closer links can be made with the food chain, consumers, tourism, industry, environmental and community groups.

To date, some 1100 farmers and over 600 farm businesses have been involved in the project. Activities at Bishop Burton include:

- the establishment of several farm business clubs, which meet regularly and engage with specialists from commercial companies, environmental agencies (eg FWAG) and the levy bodies (eg HGCA, MLC)
- a virtual demonstration farm for the pig industry, which supports best commercial and animal welfare practice through technical support and comparative performance data. The website focuses on three types of farm: a family-run farm, a multisite farm and an outdoor operation.

In addition, the college is actively engaged with Unilever, one of the largest food processing companies in the UK, in developing approaches to sustainable vining peas. The Birds Eye Sustainability project involves over 400 growers in North Yorkshire and some eastern counties. It aims to enhance the quality

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[23] DEFRA (March 2002). *Sustainable food and farming – working together*
[24] See http://www.forwardfarming.org.uk

and value of the pea crop by benchmarking local farmers' agricultural operations against 10 indicators of sustainability[25]:

- soil health
- soil loss
- nutrients
- pest management
- product value
- energy
- biodiversity
- water
- social and human capital
- local economy.

Consequently, SD is becoming an integral part of the curriculum, the farm and the college estate. Key elements of the college provision include the following.

- The college sustainability officer briefs all students on the sustainability agenda during induction.
- Sustainability is part of the college strategy and operational plan.
- A college sustainability group has been established to focus and prioritise internal and external actions.
- The farm is a well-established LEAF demonstration farm and member of LEAF, incorporating arable stewardship and trial work.

Key elements of the curriculum changes include:

- precision farming using GPS, leading to lower inputs of nitrogen, herbicides and fungicides
- integrated farm management, leading to a reduction in waste and pollution and improved soil health and biodiversity
- systems thinking and sustainable agriculture.

[25] See http://www.unilever.com, link to environment and society.

Appendix 3: Glossary

AS/A	Advanced Supplementary / Advanced level
AVCE	Advanced Vocational Certificate in Education
BSE	Bovine Spongiform Encephalopathy
CoVE	Centre of Vocational Excellence
CPD	Continuing Professional Development
CSR	Corporate Social Responsibility – minimising the negative aspects of business activity on society and the environment
CITB	Construction Industry Training Board
DEFRA	Department for the Environment, Food and Rural Affairs
ECAT	European Centre for Aerospace Training – title of Macclesfield College's CoVE
EMAS	Eco-Management and Audit Scheme – voluntary initiative designed to improve companies' environmental performance
FWAG	Farming and Wildlife Advisory Group – this provides advice to farmers and growers on environmental improvements
GDP	Gross domestic product
GM	Genetically modified
GPS	Global positioning system
HGCA	Home Grown Cereals Authority – markets products based on UK cereals
LEAF	Linking Environment and Farming – an environmental charity concerned with integrated farm management and the environment
MLC	Meat and Livestock Commission – markets British meat
SD	Sustainable Development
SDG	Specialist Development Group – network meeting for CoVEs organised by LSDA on behalf of the LSC
SME	Small or medium-sized enterprise
VLE	Virtual Learning Environment – making use of computer applications and communication technology in learning
FACE	Farming and Countryside Education – helping young people understand farming and sustainable countryside